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## Identification and Measurement of Logistics Cost Parameters in the Company

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### Abstract

This paper discusses the problem of identification and measurement of logistics cost parameters in the accounting information system indicating their impact on business management processes. The first part of the study presents the identification and measurement of logistics costs from the perspective of broadly understood business management. The subsequent part of the paper exposes the results of the empirical research in the field of logistics costs analysis in the production company. The attention has been focused on the factors that improve management efficiency by the identification and implementation of control mechanisms of logistics costs in business management. The aim of the paper is to learn and assess the relationship existing between the level of analytical identification of logistics costs in the analyzed areas and the efficiency of management. The research methods applied to achieve the objective are literature studies, descriptive analysis and trend analysis of logistics costs. The research period covers the years 2013 – 2015. The problem of identification and measurement of logistics costs in the company is important and up-to-date on account of its impact on management processes in the area of business efficiency.

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### 1. Introduction

Efficient business management and particularly decision-making, based on economic information (Borowiecki, 2011), requires data not only on the obtained results (Nogalski, 2013), but also on the costs incurred. Complete economic information, apart from the income earned, should also include a statement of costs incurred

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(Romanowska, 2010). This principle also applies when the company intends to study logistics costs. Identification and measurement of logistics costs should include dynamic characteristics of material flows and logistics processes in which materials are stationary and do not change their position, i.e. they constitute stocks (Weselick, 1999). To analyze logistics costs, the enterprise does not have to create a new account of costs. In order to carry out the study of the trend line of logistics costs, recording solutions in the accounting system can be used for the purposes of dividing cost items, enabling identification and measurement of economic events in terms of logistics costs. The aim of this paper is to explore and assess the dependencies between the level of the analytical identification of logistics costs in the analyzed areas and the efficiency of management. The applied research methods are literature studies, case study, descriptive analysis and trend analysis of logistics costs. Case study has been applied in management sciences as a qualitative scientific method since mid-1990s. Conducting the research process using a case study allows for searching for creative solutions and presenting an accurate and in-depth image of the examined phenomena and relationships. However, the limited (probabilistic) possibility of scientific cognition using the case study method should be noted. The constraints of a case study as a scientific method are: intuitiveness and subjectivity of judgements, low representativeness of results and high costs of conducted research. The empirical studies have been conducted on the basis of economic information obtained from a selected manufacturing company in Poland.

## 2. The essence of logistics costs in the company

Logistics in the company is one of many factors generating costs which may significantly contribute to the financial position of enterprises (Nowak, 2004, Caban, 2001). The concept of cost has always accompanied each business activity, and logistics constitutes an important part of entrepreneurial activity, which implies the possibility of systematic cost reduction in the company. A slight reduction in costs may be decisive in maintaining a competitive position on the market by the company (Osińska, 2013).

The definition of cost as the starting point of the considerations can be found in the Accounting Act, based on the general definition of costs and losses. Costs constitute a probable decrease in economic benefits in the reporting periods of a reliably determined value in the form of a reduction in the value of assets or an increase in the value of liabilities, which will lead to a reduction in equity in a different way than a withdrawal of funds by owners (Journal of Laws of 2013). The presented financial approach to costs also refers to logistics costs which, in a different aspect, amount to the consumption of the accumulated resources using human labor and third-party services (Stock, Noel, Kasarda, 2000, Micherda, 2013). The presented definition of logistics costs is closer to the latter of the introduced approaches to the concept of cost.

In the subject literature it is emphasized that logistics costs are a detailed category of costs meaning monetary value of the consumption of the company assets, caused by planning, implementation and control of non-technical processes of displacement of all forms of materials in time and space (Kufel, 1990, Meade, Sarkis, 1998, Kościelniak, 2011, Nowakowska Gunt, 2013). Therefore, the subject of logistics cost is complex in nature with reference to both processes and objects related to the formation of the analyzed costs. However, it should be pointed out that the complexity at the process level amounts to the costs of the whole stream of the materials flow. On the other hand, at the object level, it only includes the costs presenting a reduction in costs of the company related to the preparation and implementation of logistics processes (Nowicka – Skowron, 2000).

According to J. Kwejt, there is a need to include plan-based amounts in the concept of logistics costs, as in his opinion logistics costs include:

- planned logistics costs, mainly concerning the transportation of supplies, manufacturing, maintenance and expiry of stocks, warehouse and transport management, interest rates on credits, communication and information costs,
- more than planned and unscheduled logistics costs, e.g. maintenance of excessive stocks (warehousing, service, interest rates on credits), improper transport expenses,
- losses due to improper materials management, e.g. downtime caused by failure in materials delivery, production shortages caused by inappropriate materials, penalties for improper ordering and deliveries (Kwejt, 1982, Skowron – Grabowska, 2014).

B. Szałek claims that logistics costs must be identified as direct costs (transport, warehouses, stocks, handling, communication) and indirect costs. Logistics costs can be classified as:

- fixed and variable costs,
- procurement, production and distribution costs,
- material and immaterial costs,
- costs of logistics processing and ventures recommended by logisticians,
- pure logistics costs (Szałek, 2015).

Cz. Skowronek defines logistics costs as the consumption of human labor, measures and objects of labor, financial expenses and other negative effects of extraordinary events, expressed by the amount of money, which are caused by the flow of tangible goods (raw materials, materials, products, goods) in the company and between companies, and also the maintenance of stocks (Skowronek 1997 Bowersox, Closs, Cooper, 2002, Xian-min 2005).

Another approach is presented by H. Pfohl indicating the complexity of warehouse management costs, among which the main items are listed:

- order processing costs,
- transport costs,
- inventory management costs
- warehousing costs (Pfohl, 1998).

All the listed definitions and attempts to identify logistics costs indicate their complexity. General descriptions aim at recognizing logistics costs as the specific financial effort essential for the performance of logistics tasks (Nowicka – Skowron, 2000, Töyli, 2008).

### **3. Logistics costs as the instrument creating the financial result of the company**

Focusing on the minimization of logistics costs while maintaining the highest possible effectiveness leads to considering logistics costs as the instrument creating the financial result of the company, affecting the value of equity in terms of the definitions of costs presented by the legislator. In this context, the definitions of costs constitute the basis for the identification of categories of logistics costs, taking into account cost centers. However, they are not a separate economic measure, they constitute an integral part of costs incurred by the company which does not isolate analytical devices for their observation.

Under the Polish balance sheet law, the division of expenses by function has the following form:

- manufacturing costs of products sold, consisting of direct and indirect manufacturing costs,
- sales costs,
- general administrative expenses (Journal of Laws of 2013).

The presented cost items, in accordance with the Accounting Act, do not fully reflect the information on logistics costs incurred by the company. It seems that the right point for the observation of logistics costs is the point of classification of expenses by function, which isolates the items in terms of cost centers. In this setting, it is possible to isolate logistics costs as a separate cost center. However, in practice, such solutions are hardly ever encountered (Łacny, 2013).

A helpful tool for identifying logistics costs in the company may be expansion of the classification of costs by their cost centers using tools provided by broadly understood accounting, aimed at both satisfying information needs of top management and also its environment. In order to isolate logistics costs out of the total costs of the company it is essential to cite the definitions of logistics costs which reflect their scope and essence.

To indicate logistics costs centers, the following areas of the company activity must be considered:

- obtaining materials, intermediate products and other products from suppliers,
- storage of materials and residual waste,
- external and in-house transport,
- production planning defining intensity of the flow of materials in the field of production,
- storage of intermediate products,
- storage of finished products,
- transfer of finished products to consignees (Łacny, 2013).

Logistics costs are difficult to identify in the structure of costs classified by type or costs classified by function, which is affected by the existing solutions in the field of cost accounting records. Logistics costs may be isolated in the classification of expenses by function using appropriate criteria for the division of the total costs incurred by the company. The criteria for the separation of logistics costs may be adopted on the basis of the principles applied in the classification of expenses by function and according to the specificity of the logistics system used by the specific company. On the basis of the above considerations, the following criteria for the division of logistics costs may be adopted:

- by type, in accordance with the accounting system,
- by cost center, isolated in the accounting system,
- by relationship with the basic types of logistics processes, i.e. the flow of materials, information and stock maintenance,
- volatility relating to the size of the flow of materials or the maintained inventory (Folta & Godlewska & Godlewski, 2013).

The identification and analysis of logistics costs in accordance with the presented criteria is conducted if the share of these items is found significant and amounts to about 10-20% of the total costs of the company (Weselik, 1999). The Accounting Act, while defining the concept of cost, has related it to the effect on equity and not the measure of consumption. Taking into account this perspective, the division of costs into material and immaterial costs, which constitutes the measure of the consumed resources, considering the obtained effects, disappears.

The practice of Polish enterprises indicates that an important role in the management of logistics processes is played by costs of the flow of materials in the company, being inherently related to broadly understood warehouse management. In the costs of materials management and, in a broader sense, in logistics costs, there are reserves connected with the rationalization of costs incurred for the whole of material flows in the company. The isolation of sales in the classification of expenses by function, resulting from the income statement classification of expenses by function, has become a regularity. However, in many companies, the costs of purchasing, which are increasingly difficult to identify on the basis of documents included in the accounting system, disappear. At the same time, in some enterprises, a significant cost item associated with provision of material resources disappears, bringing about the loss of the opportunity of affecting their level. Enterprises, which isolate the costs of purchasing from the total costs incurred as separate items in the accounts of costs, lose the opportunity to observe warehouse management costs after delivery of the material to the warehouse of the company. Warehouse management costs are usually included in general administrative expenses without highlighting individual cost items. Warehousing costs included in management costs result in a loss of the opportunity to observe a significant area of logistics costs. Consequently, a significant part of the costs of warehouse management, incurred at the level of the company, disappears from the accounts and this includes:

- costs of frozen capital in warehouse stocks,
- costs and the way of storage of materials,
- costs of the structure of warehouses, the way of their arrangement and operation,
- costs of losses arising in the course of storing the resources,
- costs of maintenance of proper inventory level,
- costs of current functioning of storage cells,
- costs of loss of profit due to inventory shortages (Weselik, 1999).

Rational warehouse management consists in adjustment of the structure and volume of the materials stored to the actual needs for raw materials of the company, while simultaneously taking into account the frequency of deliveries (Skowron – Grabowska, 2007). Reduction in costs of the company may be achieved through the rationalization of warehouse management which generates most of logistics costs, which will increase the performance of the entire company, improving the financial result and economic position.

#### **4. Measurement of logistics costs in the company – case study**

The empirical studies were conducted on the basis of targeted sampling based on the economic information of a medium-sized manufacturing company, located in the Silesian Voivodeship. The research period covered the years 2013 – 2015. The applied research tool, enabling the measurement of logistics costs in the surveyed company was

the analysis of the costs of procurement, manufacturing and sales isolated in the classification of expenses by function, since they characterize the phenomena at individual stages of the supply chain flow in the company.

The area of the company activity covers the entire Polish region and, to a large extent, Lithuania, Latvia, Russia, Hungary, Romania and Germany. The company manufactures a whole range of accessories for window decoration such as curtain rods, blinds, pleats. In 2004, the company obtained the ISO 9001:2001 certificate. On the other hand, in the years 2009 and 2010 it was awarded the Consumer's Laurel prize by consumers. In 2009 the company changed its organizational and legal form from a general partnership to a limited partnership, which was reflected in the organizational structure and the scope of duties performed by the isolated cells. The company mainly supplies network customers while collaborating with many smaller businesses, selling finishing goods as well as providing services in the field of interior decoration. The surveyed company does not have its own transport fleet to provide services to customers, therefore, a transport company, possessing four IVECO delivery vans of a maximum permissible laden weight of 3.5 tons each, is responsible for carrying the goods to end-customers. Additionally, the company established cooperation with a corporate logistics operator.

In the surveyed company, the member of the board dealing with procurement, production and logistics is responsible for production and logistics areas. Via the subordinate managers of individual departments, they supervise 63 employees dealing with direct production, assembly and packaging of products.

Sales, marketing and product management department consists of 12 people responsible for providing sales service to customers by preparing orders for fulfillment and their after-sales invoicing. Each employee has a permanently assigned group of customers they are in touch with constantly. The sales department consists of four sales representatives who are assigned the fields of activity in the area of Poland and provide services to stands maintained with customers while familiarizing clients with the current offer of the company. The export department, isolated from the structure, is responsible for sales of products abroad, all types of documentation, configuration of international transport and the circulation of customs documents. The employees of the marketing department prepare leaflets, advertising brochures, they work on the visualization of stands maintained with the contractors and they are responsible for updating the company website.

The finance and accounting department along with the human resources and administration department consist of 8 people. The employees of the finance and accounting department deal with keeping records of business operations carried out in the company and they also control the people entrusted with the custody of the company assets. The administrative section is responsible for the proper maintenance of company assets, while ensuring its efficiency.

At the first stage of the research procedure in the field of logistics costs the identification, being the object of the research, the following costs were identified:

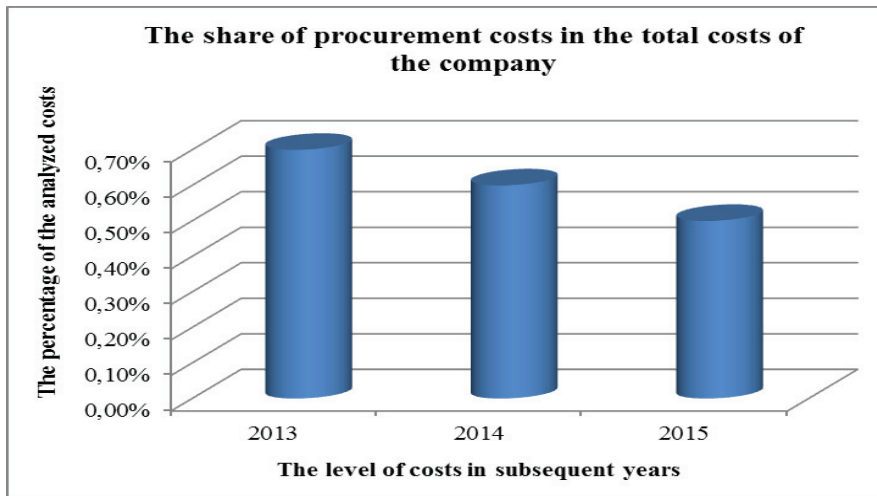
- the purchasing department costs,
- the production department costs (with the isolation of costs of obtaining raw materials, storage of inventories, semi-finished and finished products),
- the sales department costs (with the isolation of costs of serving the domestic market, export markets, and the costs of sales representatives operation).

In the surveyed company, the isolated expenses by function characterize the cost centers in the company. The classification of expenses by function includes the criterion for identifying costs to improve the management of key areas of the company functioning.

At the second stage of the research procedure, other costs were identified, with their division corresponding to cost centers, by the following items: costs of the marketing department, costs of the accounting department and general administrative expenses.

While analyzing the analytical items of the isolated logistics costs of the surveyed company, attention was drawn to the trend of logistics costs in the listed cost items. The year 2013 was the first year of the company activity when the costs were isolated following the above pattern. The obtained research results are presented in Figures 1, 2 and 3.

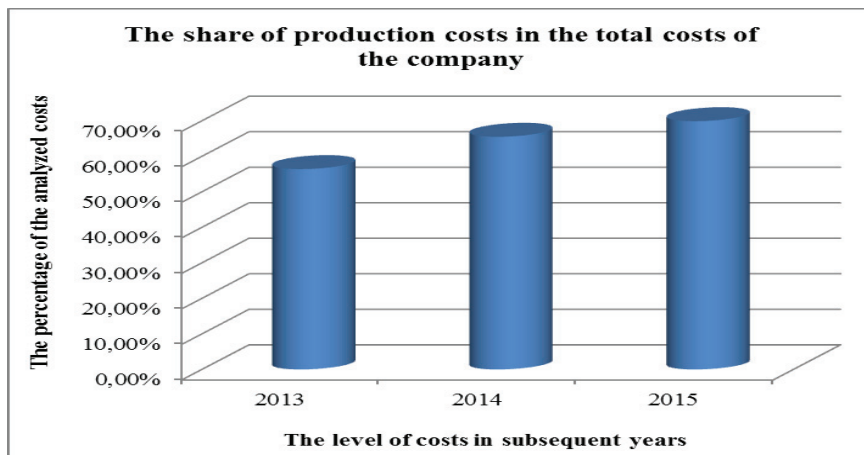
The conducted research in the field of the trend analysis of procurement costs indicates a slight decline in the costs of this stage of the logistics process, which is the result of the cumulative supplies of raw materials for the production of blinds and pleats. The suppliers of curtain rods maintained constant price levels over the research period (Fig. 1).



Source: Authors' own study.

Fig. 1. The percentage share of procurement costs in the total costs of the company

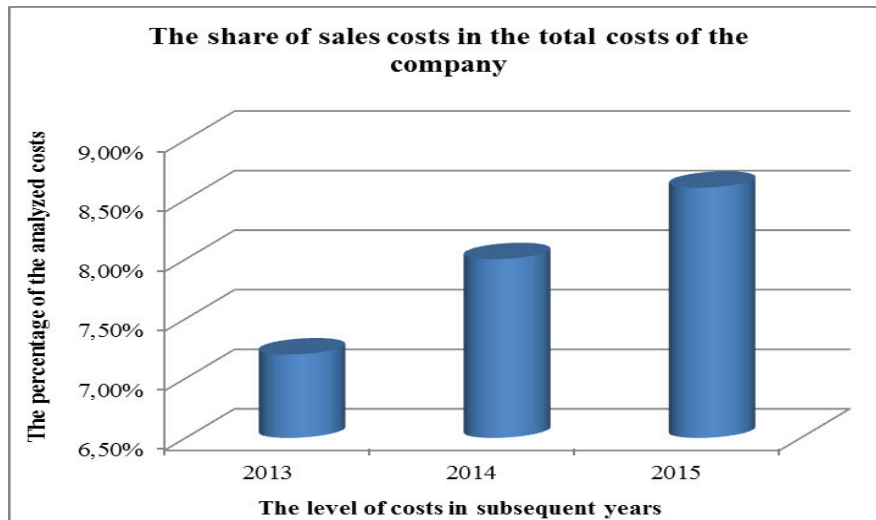
While analyzing the production costs, an upward trend can be noticed, which is caused mainly by the change in the assortment of goods manufactured by the company. The company significantly increased the production of blinds and pleats, the essential component of which is labor cost, which resulted in an increase in production costs. Among production costs, storage costs and internal transport costs were decreased per unit of product, since in the research period there was an increase in the volume of production (Fig. 2).



Source: Authors' own study.

Fig. 2. The percentage share of production costs in the total costs of the company

While analyzing the trend of sales costs, we can notice a slight increase in these costs, qualified as a part of logistics costs in the unit. The upward trend was caused by extending the range of sales assortment and employing an additional employee in the sales department. In the surveyed company, sales costs per unit of products sold did not change (Fig. 3).



Source: Authors' own study.

Fig. 3. The percentage share of sales costs in the total costs of the company

The presented studies indicate that while there is a steady increase in the share of production costs and a stable share of sales costs in the total costs of the company, there is a downward trend in the costs of the procurement stage. Taking into account the above considerations, it can be concluded that the aim of the measurement of logistics costs is the valuation of logistics processes and planning and control of the logistics activity of the company.

## 5. Conclusions

The aim of this paper was to find and assess dependencies taking place between the level of the analytical identification of logistics costs in the analyzed areas and the efficiency of management. In the light of the conducted considerations it can be concluded that the information obtained during the analysis of logistics costs enable rapid response in the event of changes in external factors. Determining the trend line of logistics costs makes it easier to make good decisions in the area of the operational strategic stock, thereby increasing the efficiency of management of logistics processes in the surveyed company.

Isolation of logistics costs in the accounting system is possible with the classification of expenses by function, taking into account the flow of resources in each specific company. The separation of logistics costs is significant from the point of view of increasing efficiency of business management since identification, measurement and recording of logistics costs constitute the basic condition for improvement in management of the discussed costs.

The recommendation for the analyzed company is implementation of the analytical division of production costs with isolation of the costs of storage, internal transport and the costs of the warehousing units functioning. Such a solution would allow for the assessment of logistics costs regarded as the element of the total costs incurred by the company. This statement is confirmed by the fact that detailed separation of costs of the stage of procurement indicated a downward trend, which informs on the improvement in the efficiency of management in the surveyed company.

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